

REMARKS

Claims 1-14 are pending in the application. New claim 15 has been added to the application. Therefore, claims 1-15 are at issue.

Support for new claim 15 can be found in the specification at page 2, lines 26-32. The claim amendments are fully supported by the present specification and original claims, and are discussed below in connection with the claim objections and rejections.

Claims 1, 3, 6, and 10 stand objected to. The typographical errors in claims 1 and 3 have been corrected, as has the agreement error in claim 10. The term "further" has been introduced into claim 6. In view of these amendments, it is submitted that the objections to the claims have been overcome and should be withdrawn.

Claims 1-12 and 14 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite because of confusing language. In response, claim 1 has been amended to more clearly recite that the claimed process comprises polymerizing a supersaturated aqueous solution of a (meth)acrylate salt. In view of the rewording of claim 1, it is submitted that this rejection of claims 1-12 and 14 under 35 U.S.C. §112, second paragraph, should be withdrawn.

With respect to claim 3, this claim also has been amended to clarify the claim by reciting that the supersaturated solution is prepared by first producing an overneutralized, i.e., more than 100 mole percent neutralized, (meth)acrylate salt solution at a temperature less than 40°C. This amendment removes confusion with respect to the neutralization step itself reducing the temperature. Accordingly, it is submitted that this rejection of claim 3 under 35 U.S.C. §112, second paragraph, has been overcome and should be withdrawn.

With respect to claim 10, the claim has been amended to depend from claim 3. Claim 10 now has a proper antecedent basis, and the rejection under 35 U.S.C. §112, second paragraph, should be withdrawn.

Claims 1-4, 6, 9-12, and 14 stand rejected under 35 U.S.C. §102(b) as being anticipated by Shimomura et al. U.S. Patent No. 5,210,298 ('298). Claims 5, 7, 8, and 13

stand rejected under 35 U.S.C. §103 as being obvious over the '298 patent in view of GB 1,073,856 (GB '856). Applicants traverse these rejections.

The present invention is directed to a method of preparing a (meth)acrylic polymer by polymerizing a *supersaturated* aqueous solution of a (meth)acrylic salt. As disclosed in the specification at page 2, lines 26-32, a supersaturated solution is a metastable state where *more* of the (meth)acrylate salt is in solution than a fully saturated solution of the salt at thermodynamically stable equilibrium. In particular, a supersaturated solution contains more than 1.01 times the amount of (meth)acrylate salt compared to the thermodynamically stable solution.

It must be understood that a supersaturated (meth)acrylate salt solution is different from an overneutralized (meth)acrylate salt solution. Whereas the term "supersaturated" refers to the amount of (meth)acrylate salt in the solution, the term "overneutralized" refers to the degree of neutralization of the (meth)acrylic acid, i.e., the (meth)acrylic acid is more than 100 mol % neutralized. See specification, page 5, lines 35-38 and page 4, lines 19-24. Also see attached Exhibit A, a definition of "supersaturated" from "Hawley's Condensed Chemical Dictionary" (1987), page 1111. A (meth)acrylic acid solution can be overneutralized, but not supersaturated, and *vice versa*. A (meth)acrylic acid solution also can be overneutralized and supersaturated. The two terms are independent of one another.

With respect to the anticipation rejection under 35 U.S.C. §102(b), it is well understood that

"TO ANTICIPATE A CLAIM, THE REFERENCE MUST TEACH EVERY ELEMENT OF THE CLAIM"

'A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.' *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)... 'The identical invention must be shown in as complete detail as is contained in the...claim.' *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim, but this is not

an *ipsissimis verbis* test, i.e., identity of terminology is not required. In *re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990)."

With respect to the obviousness rejection under 35 U.S.C. §103, to establish a *prima facie* case of obviousness, three requirements must be satisfied. First, as the U.S. Supreme Court held in *KSR International Co. v. Teleflex Inc. et al.*, 127 S.Ct. 1727 (2007), "a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions. ...it [may] be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was *an apparent reason* to combine the known elements in the fashion claimed by the patent at issue. ...it can be important to *identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements* in the way the claimed new invention does... because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known." (emphasis added, *KSR, supra*). Second, the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *Amgen Inc. v. Chugai Pharm. Co.*, 18 USPQ2d 1016, 1023 (Fed. Cir. 1991). Lastly, the prior art references must teach or suggest all the limitations of the claims. In *re Wilson*, 165 USPQ 494, 496 (C.C.P.A. 1970).

As recently articulated by the Court of Appeals for the Federal Circuit in *Ortho-McNeil Pharmaceutical Inc. v. Mylan Laboratories Inc.*, 86 USPQ 2d, 1196, 1201-2 (Fed. Cir. 2008):

"As this court has explained, however, a flexible TSM test remains the primary guarantee against a non-statutory hindsight analysis such as occurred in this case. In *re Translogic Tech., Inc.* 504 F.3d 1249, 1257 [84 USPQ 2d 1929] (Fed. Cir. 2007) ("[A]s the Supreme Court suggests, a flexible approach to the TSM test prevents hindsight and focuses on evidence before the time of invention.)."

The cited '298 patent discloses a method for the production of a neutralized acrylic acid polymer by neutralizing acrylic acid, including a step of overneutralizing the acrylic acid, then reducing the degree of neutralization to 20 to 100 mol% by the addition of acrylic acid, followed by a polymerization reaction to form the polyacrylate. See '298 patent, column 3, lines 1-18.

The examiner relies upon the Examples of the '298 patent to support the anticipation rejection. However, differences exist between the '298 patent and the present claims. First, the *overneutralization* step of the '298 was maintained *at 40°C* (Example 1, column 8, lines 53-58), whereas the present claims recite a temperature *below 40°C*.

More importantly, the concentration of acrylate salt in the '298 patent examples is 25 wt% and 30 wt%, as stated by the examiner. However, this concentration is a standard monomer solution concentration used in the art and is *below a supersaturated* concentration, as presently claimed. The monomer is partially neutralized prior to polymerization. The '298 patent fails to teach or suggest polymerizing a *supersaturated* solution of the (meth)acrylate salt.

At paragraph 12 of the Office Action, the examiner notes that a 100 mol% neutralized acrylate salt at a concentration of 30-40 wt% is treated with additional hydroxide base to bring the degree of neutralization to more than 100%, thereby possibly bringing the monomer concentration to less than 30 wt%. However, the examiner has neglected the fact that, in the present invention, *additional* acrylic acid also is added, which *increases* the concentration of (meth)acrylate solution to greater than saturation. See specification, page 6, lines 2-24, and particularly, lines 12-17. Also, see claim 3, which specifically recites the addition of further acrylic acid.

The examiner admits, in paragraph 12 of the Office Action, that the '289 patent fails to disclose supersaturation, and that the reference does not disclose an acrylate salt in the amount of slightly more than 30 wt%. Contrary to the examiner's other statements, the acrylate concentration used in the '298 patent is standard in the art and it is not a supersaturated solution.

It is submitted that the term "supersaturated" recited in the claims cannot be ignored. The present claims do not relate to polymerizing an unsaturated aqueous solution containing less than 30 wt.% sodium acrylate. The present claims are directed to polymerizing a sodium acrylate solution of 30 wt% *only* if it is supersaturated. As described in the specification (e.g., page 2, lines 26-32), supersaturation means that the solution is metastable and contains more dissolved salt than would be soluble. Temperature is a factor in supersaturation, as pointed out in the specification at page 3, lines 31-41. As correctly stated in the Office Action, the '289 patent is silent with respect to supersaturation. Consequently, the '289 patent cannot anticipate the present claims.

Because differences exist between the present claims and the '298 patent disclosure, a novelty rejection based on 35 U.S.C. §102(b) cannot be maintained. See MPEP §2131. In addition, it is submitted that the difference between the present claims and the '289 patent are nonobvious differences.

As stated above, the '289 patent is directed to a polymerization method wherein acrylic acid is neutralized, then overneutralized, and allowed to sit, followed by an addition of further acrylic acid to provide a partially neutralized acrylic acid in an amount that is less than the saturation amount. The concentration of partially neutralized acrylic acid solution utilized in the '289 patent is the standard amount used in the art. The '289 patent fails to teach or suggest, or even consider or address, polymerizing a supersaturated (meth)acrylate solution, contrary to the assertions of the examiner.

As recognized by the examiner, the '289 patent fails to teach or suggest the content of dimer or inhibitor in the acrylic acid, or the use of a solid acrylate salt. GB '856 fails to overcome the deficiencies of the '289 patent, particularly with respect to polymerizing a supersaturated (meth)acrylate salt solution.

The examiner relies upon GB '856 for a teaching of providing solid sodium acrylate containing a low amount of impurities. Although GB '856 teaches an improved method of preparing sodium acrylate by precipitation from methanol, the reference teaches nothing more. All eight examples of GB '856 show production of a sodium acrylate. The reference contains *no* disclosure with respect to polymerizing the resulting solid sodium

acrylate. Accordingly, GB '856 cannot teach or suggest polymerizing a supersaturated solution of sodium acrylate. In addition, GB '856 teaches essentially 100% sodium acrylate, as opposed to a partially neutralized (meth)acrylate salt used in the present claims, for example in claim 2.

In view of the above, a case of *prima facie* obviousness of claims 1-14 over a combination of the '289 patent and GB '856 cannot be established. First, and importantly, the combination of references fails to teach or suggest every claimed feature. In particular, neither the '289 patent nor GB '856 teaches polymerization of a *supersaturated* aqueous solution of a (meth)acrylate salt. GB '856 fails to teach *any* polymerization of the solid sodium acrylate, and the '289 patent teaches polymerization of a partially neutralized acrylic acid solution that is not saturated, but in a concentration that is standard in the art.

Second, neither reference nor the combination of references provides any apparent reason for a person skilled in the art to modify the teachings in the references and combine the elements in a way the claimed invention does, i.e., there is no apparent reason from the '289 patent and/or GB '856 for a person skilled in the art to provide a supersaturated (meth)acrylic salt solution, and polymerize the supersaturated solution.

Accordingly, it is submitted that claims 1-14 would not have been obvious to a person skilled over a combination of the '289 patent and GB '856, and that the rejection of claims 1-14 under 35 U.S.C. §103 should be withdrawn. It is further submitted that new claim 15 is patentable over the cited references for the same reason claims 1-14 are patentable over a combination of the '289 patent and GB '856.

In summary, all pending claims are in a condition for allowance. An early and favorable action on the merits is respectfully requested.

Should the examiner wish to discuss the foregoing, or any matter of form in an effort to advance this application toward allowance, the examiner is urged to telephone the undersigned at the indicated number.

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Respectfully submitted,

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*Hawley's
Condensed Chemical
Dictionary*

HAWLEY

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hydrocarbon resins and olefins.

used for finishing paper from 3 to 12 or the sheet is threaded. Use of chilled cast iron intermediate rolls, several types. Overall widths creating speeds range wide. The supercalendering to high-grade coated, as a result of a resilient fiber

paper.

phenomenon in which compounds at temperature zero lose both magnetic permeability, conductivity. Depend on maximum temperature for the phenomenon. Superconductivity in metals, noble metals, metals. It is well known, 5, or 7 valence electrons with high room-temperature system for transmission by means of superconductivity.

that is maintained (the temperature is affected by pressure), and diffuse more thus more efficient in chromatography.

low-density polyethylene pressure process, sheets, film, pipe, etc.

sulfur air-classified resins, one 93% and US sieve. Resins, chrome oxide black foods, pyrotechnic petroleum; cast.

totally neutral liquid on of highly active emulsifiers, soluble in

"Superloid."²²² TM for ammonium alginate, a hydrophilic colloid.

Use: Suspending, thickening, emulsifying, and stabilizing agent in creaming and bodying of rubber latex products; protective colloid in resin emulsion paints, adhesives, fire-retarding compositions, ceramics, etc.

"Superlume."²²⁴ TM for a super-leveling bright nickel electroplating process on steel stampings, brass, copper, zinc die castings, etc. The materials used are nickel sulfate, nickel chloride, boric acid, and addition agents.

supernatant. A liquid or fluid forming a layer on the surface of another liquid.

superoxide. A compound characterized by the presence in its structure of the O_2^- ion. The O_2^- ion has an odd number of electrons (13) and as a result all superoxide compounds are paramagnetic. At room temperature they have a yellowish color. At low temperature many of them undergo reversible phase transitions accompanied by a color change to white. The stable superoxides are:

sodium superoxide	NaO_2
potassium superoxide	KO_2
rubidium superoxide	RbO_2
cesium superoxide	CsO_2
calcium superoxide	$Ca(O_2)_2$
strontium superoxide	$Sr(O_2)_2$
barium superoxide	$Ba(O_2)_2$
tetramethylammonium superoxide	$(CH_3)_4NO_2$

In these compounds each oxygen atom has an oxidation number of $-1/2$ instead of -2 , as a normal oxide.

superpalite. (diphosgene; green cross gas; trichloromethylchloroformate). $ClCOOCCl_3$.

Properties: D 1.6525, bp 127.5–128C.

"Superpax."²²⁷ TM for 92–94.5% zirconium silicate with bulk d 68 lbs/cu ft, average particle size 5 microns max.

Use: Ceramic glazes and as a filler for resins and rubbers.

superphosphate. (acid phosphate). The most important phosphorus fertilizer, made by the action of sulfuric acid on insoluble phosphate rock (essentially calcium phosphate, tribasic) to form a mixture of gypsum and calcium phosphate, monobasic. A typical composition is $CaH_4(PO_4)_2 \cdot HOH$ 30%, $CaHPO_4$ 10%, $CaSO_4$ 45%, iron oxide, alumina, silica 10%, water 5%.

Typical analysis: Moisture 10–15%, available phosphoric acid (as P_2O_5) 18–21%, insoluble phosphoric acid 0.3–2%, total phosphoric acid (as P_2O_5) 19–23%.

Grade: Based on available P_2O_5 .

Use: Fertilizer.

See also triple superphosphate and nitrophosphate.

superphosphoric acid. See polyphosphoric acid.

supersaturation. The condition in which a solvent contains more dissolved matter (solute) than is present in a saturated solution of the same components at equivalent temperature. Such solutions may occur, or can be made, when a saturated solution cools gradually so that nucleating crystals do not form. They are extremely unstable and will precipitate upon addition of even one or two crystals of the solute or upon shaking or other slight agitation. Supersaturated solutions occur in the confectionery industry, e.g., in fudges, maple sugar, etc.

"Supersheen."²²² TM for caustic soda solution containing chelating agent and wetting agent. Hazard: Strong irritant to skin and tissue. Use: Bottle washing and food plant sanitation.

"Super-sol."²²⁵ TM for an odorless petroleum naphtha, a rapid-drying, highly purified solvent. Use: Carrier for insecticides, preparation of odorless paints, cleaning compositions.

"Supralan."²⁰³ TM for metallized acid colors of good fastness and level dyeing properties.

"Supramine." XA.²⁰³ TM for a leather chemical, solubilized sulfur phenol condensate, 75% active.

"Supranol."²⁰³ TM for dyestuffs used on wool and silk; good fastness to light, washing, and sea water; can also be used on leather.

surface. In physical chemistry the area of contact between two different phases or states of matter, e.g., finely divided solid particles and air or other gas (solid-gas); liquids and air (liquid-gas); insoluble particles and liquid (solid-liquid). Surfaces are the sites of the physicochemical activity between the phases that is responsible for such phenomena as adsorption, reactivity, and catalysis. The depth of a surface is of molecular order of magnitude. The term interface is approximately synonymous with surface, but it also includes dispersions involving only one phase of matter, i.e., solid-solid or liquid-liquid.

See also interface, surface area, surface chemistry.

surface-active agent. (surfactant). Any compound that reduces surface tension when dis-